

July 27, 2004

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Stop P1-137
Washington, DC 20555-0001



ULNRC-05031

Ladies and Gentlemen:

**DOCKET NUMBER 50-483
CALLAWAY PLANT UNIT 1
UNION ELECTRIC CO.
FACILITY OPERATING LICENSE NPF-30
RESPONSE TO NRC BULLETIN 2004-01, "INSPECTION OF ALLOY
82/182/600 MATERIALS USED IN THE FABRICATION OF PRESSURIZER
PENETRATIONS AND STEAM SPACE PIPING CONNECTIONS AT
PRESSURIZED-WATER REACTORS"**

Enclosed is the Callaway Plant 60-day response to NRC Bulletin 2004-01, "Inspection Of Alloy 82/182/600 Materials Used In The Fabrication Of Pressurizer Penetrations And Steam Space Piping Connections At Pressurized-Water Reactors," dated May 28, 2004. NRC Bulletin 2004-01 requested information related to the materials from which the pressurizer penetrations and steam space piping connections at Callaway were fabricated, and information related to the inspections that have been and those that will be performed to ensure that degradation of Alloy 82/182/600 materials used in the fabrication of pressurizer penetrations and steam space piping connections will be identified, adequately characterized, and repaired. Callaway Plant coordinated preparation of this response with the other participants in the Strategic Teaming and Resource Sharing (STARS) group.

Attachment III lists AmerenUE commitments contained in this correspondence.

A110

ULNRC-05031

July 27, 2004

Page 2

If you have any questions regarding this submittal, please contact me at (573) 676-8659 or Mr. Dave Shafer, Superintendent – Licensing at (314) 554-3104.

Sincerely,

A handwritten signature in black ink, reading "Keith D. Young". The signature is written in a cursive style with a large, stylized "K" and "Y".

Keith D. Young
Manager - Regulatory Affairs

Attachments: I – Affidavit
II - RAI Responses
III- List of Commitments

Mr. Bruce S. Mallett
Regional Administrator
U.S. Nuclear Regulatory Commission
Region IV
611 Ryan Plaza Drive, Suite 400
Arlington, TX 76011-4005

Senior Resident Inspector
Callaway Resident Office
U.S. Nuclear Regulatory Commission
8201 NRC Road
Steedman, MO 65077

Mr. Jack N. Donohew (2 copies)
Licensing Project Manager, Callaway Plant
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Mail Stop 7E1
Washington, DC 20555-2738

Missouri Public Service Commission
Governor Office Building
200 Madison Street
PO Box 360
Jefferson City, MO 65102-0360

Mr. Jerry B. Uhlmann
Director
Missouri State Emergency Management Agency
P.O. Box 116
Jefferson City, MO 65102

STATE OF MISSOURI)
)
COUNTY OF CALLAWAY) S S

Keith D. Young, of lawful age, being first duly sworn upon oath says that he is Manager, Regulatory Affairs for Union Electric Company; that he has read the foregoing document and knows the content thereof; that he has executed the same for and on behalf of said company with full power and authority to do so; and that the facts therein stated are true and correct to the best of his knowledge, information and belief.

By Keith D. Young
Keith D. Young
Manager, Regulatory Affairs

SUBSCRIBED and sworn to before me this 27th day of July, 2004.

TERRA E. COOK
Notary Public - Notary Seal
STATE OF MISSOURI
Callaway County
My Commission Expires May 13, 2008

Terra E. Cook
Notary Public

Response to NRC Bulletin 2004-01, "Inspection Of Alloy 82/182/600 Materials Used In The Fabrication Of Pressurizer Penetrations And Steam Space Piping Connections At Pressurized-Water Reactors"

NRC Requested Information

(1) All subject PWR licensees are requested to provide the following information within 60 days of the date of this bulletin. [For lines attached directly to the pressurizer, with the exception of the surge line, the information requested in (1) and (2) above should be provided for any locations, including those remote from the pressurizer shell, which contain Alloy 82/182/600 materials which are exposed to conditions similar to those of the pressurizer environment.]

(a) A description of the pressurizer penetrations and steam space piping connections at your plant. At a minimum, this description should include materials of construction (e.g., stainless steel piping and/or weld metal, Alloy 600 piping/sleeves, Alloy 82/182 weld metal or buttering, etc.), joint design (e.g., partial penetration welds, full penetration welds, bolted connections, etc.), and, in the case of welded joints, whether or not the weld was stress-relieved prior to being put into service. Additional information relevant with respect to determining the susceptibility of your plant's pressurizer penetrations and steam space piping connections to PWSCC should also be included.

Callaway Plant Response:

The pressurizer at Callaway has 5 locations which contain Alloy 82/182/600 materials exposed to conditions similar to those of the pressurizer environment. These locations are the pressurizer spray nozzle-to-pipe connection, and the four pressurizer safety and relief nozzle-to-safe end connections. The pressurizer heater penetrations do not contain Alloy 82/182/600 materials.

Materials of construction

The Certified Material Test Reports (CMTRs) indicate that both Alloy 82 and Alloy 182 weld metals were used for all pressurizer nozzle to safe-end welds. Generally, the safe-end welds for the pressurizer were made of Alloy 182, with Alloy 82 used only for inprocess repairs.

Joint Design

These pressurizer penetrations are carbon steel nozzles with Alloy 82/182 buttering and full penetration welds connecting to stainless steel safe ends which are then connected to stainless steel piping with stainless steel safe end-to-pipe welds. Figure

1 below depicts the nozzle, nozzle-to-safe end and safe end configuration for these locations.

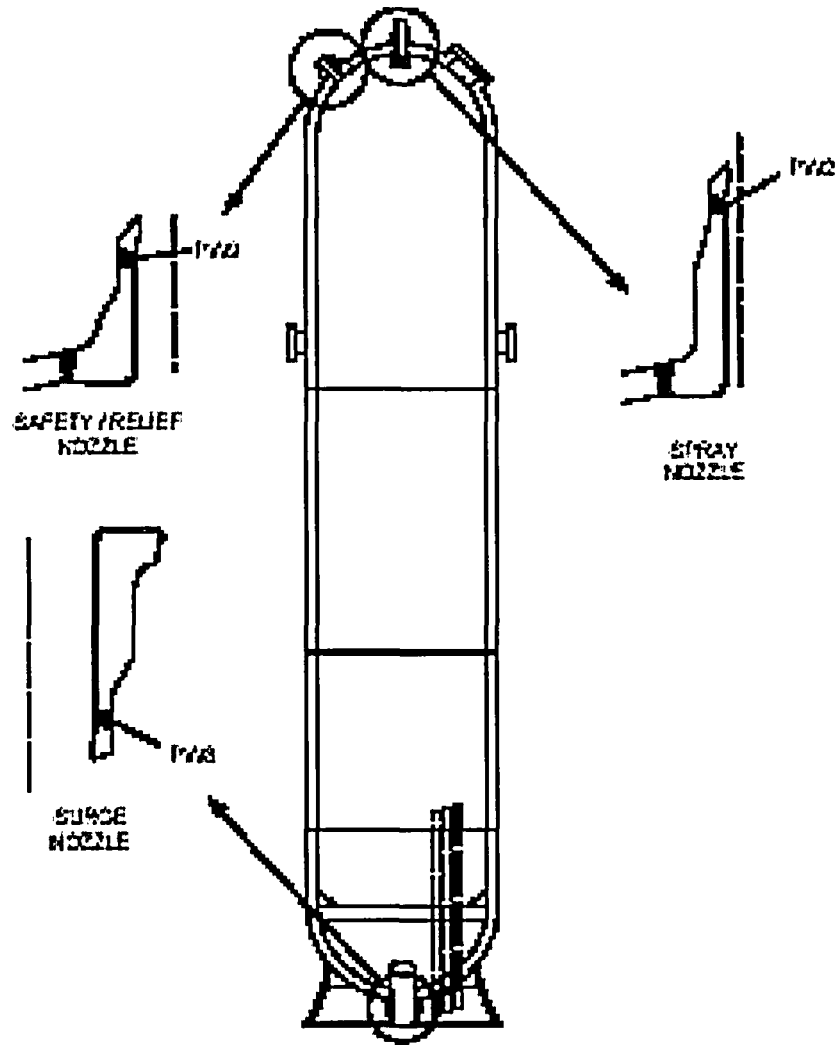


Figure 1

The nozzle buttering was stress-relieved, but the buttering-to-safe end weld was not stress relieved prior to being put into service.

The operating temperature of the pressurizer at Callaway is approximately 653 degrees F.

(b) *A description of the inspection program for Alloy 82/182/600 pressurizer penetrations and steam space piping connections that has been implemented at your plant. The description should include when the inspections were performed; the areas, penetrations and steam space piping connections inspected; the extent (percentage) of coverage achieved for each location which was inspected; the inspection methods used; the process used to resolve any inspection findings; the quality of the documentation of the inspections (e.g., written report, video record, photographs); and, the basis for concluding that your plant satisfies applicable regulatory requirements related to the integrity of pressurizer penetrations and steam space piping connections. If leaking pressurizer penetrations or steam space piping connections were found, indicate what followup NDE was performed to characterize flaws in the leaking penetrations.*

Callaway Plant Response:

Volumetric examinations were performed utilizing .25" X .25" transducers with contoured wedges. Dual 45 degree shear wave axial scans were performed from the Safe end side. 60 degree dual L wave axial scans were performed from the Nozzle side. A dual 45 degree L wave scan was performed circumferentially from both sides. The table below summarizes the examinations for the locations of interest.

Weld	Date of last inspection	Examination coverage achieved or cited (%)	NDE Method(s)	relevant indications (yes/no)	resolution of indications, if any
2-TBB03-2-W	04/15/1992	*100%	UT/PT	No	N/A
2-TBB03-3-A-W	10/26/1996	*100% Surface 88% Volumetric	UT/PT	No	N/A
2-TBB03-3-B-W	10/24/1996	*100% surface 85% Volumetric	UT/PT	No	N/A
2-TBB03-3-C-W	10/13/1999	*100% Surface 54% Volumetric	UT/PT	No	N/A
2-TBB03-4-W.	10/07/1999	*100% Surface 54% Volumetric	UT/PT	No	N/A
*Prior to appendix VIII coverage					

Notes: No rejectable indications were found.
All inspections documented by written record.

In Interval 1, all of the subject locations were examined according to ASME Section XI.

Callaway Plant implemented a Risk Informed ISI (RI-ISI) program in Period 2 of Interval 2. This was approved by the NRC in the safety evaluation contained in a letter dated January 30, 2002. The Callaway Plant RI-ISI program utilizes the methodology in EPRI TR-112657 Rev. B-A. Per this methodology these welds are Risk Category 4, which require 10% of the population to be selected for examination. Weld 2-TBB03-03-A-W and 2-TBB03-04-W are selected for examination.

A review of the risk rankings of the RI-ISI program is to be performed prior to Refuel 14. If the subject welds are moved to Risk Category 2 per the above methodology, this will require 25% of the welds to be volumetrically examined. As 2 of the 5 subject welds are already being examined, this percentage is already met.

In addition to the NDE in the table above, a bare metal visual examination of all Alloy 82/182/600 locations, including the pressurizer connections was performed during Refuel 13 (Spring 2004) in conjunction with the boric acid walkdown performed at the beginning of the refueling outage. A pressure test (VT-2) at NOP was performed near the completion of each refueling outage in accordance with ASME pressure testing requirements. No indication of pressure boundary leakage was noted in any of the locations.

The above satisfies the 10 CFR 50.55a requirements for inspection of the subject components.

- (c) *A description of the Alloy 82/182/600 pressurizer penetration and steam space piping connection inspection program that will be implemented at your plant during the next and subsequent refueling outages. The description should include the areas, penetrations and steam space piping connections to be inspected; the extent (percentage) of coverage to be achieved for each location; inspection methods to be used; qualification standards for the inspection methods and personnel; the process used to resolve any inspection indications; the inspection documentation to be generated; and the basis for concluding that your plant will satisfy applicable regulatory requirements related to the structural and leakage integrity of pressurizer penetrations and steam space piping connections. If leaking pressurizer penetrations or steam space piping connections are found, indicate what followup NDE will be performed to characterize flaws in the leaking penetrations. Provide your plans for expansion of the scope of NDE to be performed if circumferential flaws are found in any portion of the leaking pressurizer penetrations or steam space piping connections.*

Callaway Plant Response:

The Alloy 82/182/600 pressurizer piping connections will receive a bare metal visual examination in the next refueling outage in accordance with MRP letter 2004-05. The next refueling outage is RF14 (Fall 2005), which is the last refueling outage in ISI interval 2.

All of the locations of interest will continue to receive bare metal visual examinations near the beginning of each outage, as is required by the boric acid program, as well as the VT-2 examination at the end of each outage, as is required by the pressure testing program.

In ISI interval 3, as a minimum, the welds selected in the RI-ISI program will receive a volumetric examination. Callaway Plant continues to be involved in various industry groups associated with PWSCC of Alloy 82/182/600 Materials such as Alloy 600 Issue Task Group (ITG), the ASME Alloy 600 Task Group. Recommendation and requirements from these groups will be assessed, and if appropriate, changes to the Inservice Inspection Program will be made. Volumetric (UT) examinations will be qualified in accordance with Appendix VIII of ASME Section XI, as modified by 10 CFR 50.55a, to the extent possible. Currently, no Appendix VIII qualification exists which allows for examination of Dissimilar Metal (DM) welds when adjacent welds are included in the scan path as is the case at Callaway. Best industry practices will be utilized where formal qualifications are not feasible. Qualification or demonstration will include procedures, equipment, and personnel

If examination volume composite coverage is not essentially 100% (i.e., > 90% of the exam volume shown in Figure IWB-2500-8 of ASME Section XI) relief pursuant to 10 CFR 50.55a(g)(5)(iii) will be requested.

If any cracking, leakage or degradation is detected during the inspection, corrective actions will be taken in accordance with the plant's corrective action program and procedures. Any RCPB leakage or degradation would be considered a significant condition adverse to quality and appropriate actions, including performing a cause analysis, will be taken

Documentation will be commensurate with the requirements of the inspection. Visual examinations will have written records as a minimum and photographs as appropriate. Manual ultrasonic exams will have written reports.

The regulatory requirements of 10 CFR 50.55a for the second ISI interval have been met. Callaway Plant will continue to meet the regulatory requirements of 10 CFR 50.55a in developing the 3rd ISI interval program plan.

Plant Technical Specifications do not allow for reactor coolant pressure boundary leakage. For a flaw with a through wall leak, sufficient NDE to facilitate the

appropriate repair will be performed. This would generally be a volumetric examination(s) sufficient to determine the length and direction of the flaw. As a minimum, the requirements of the ASME Code will be met.

Expansion of scope would be, as a minimum, in accordance with ASME Section XI.

- (d) In light of the information discussed in this bulletin and your understanding of the relevance of recent industry operating experience to your facility, explain why the inspection program identified in your response to item (1)(c) above is adequate for the purpose of maintaining the integrity of your facility's RCPB and for meeting all applicable regulatory requirements which pertain to your facility.*

Callaway Plant Response:

The Callaway Plant inspection program is adequate to maintain the integrity of the Reactor Coolant Pressure Boundary (RCPB) in the area of pressurizer. To date, visual inspections have been the primary means of identification of through wall leakage associated with Alloy 82/182/600. The RCPB visual inspections conducted each refueling includes inspection of the Alloy 82/182 welds associated with the pressurizer as described in (1)(c) above. Volumetric examinations are also performed in accordance with the Callaway Plant ISI program. As Callaway Plant has implemented a Risk-Based program which complies with the guidelines of EPRI TR-112657, Revised Risk-Informed Inservice Inspection Evaluation Procedure, Rev B-A, the volumetric examination locations and frequency are based on a determination of the welds most susceptible to failure or whose failure has the most serious consequences.

The Alloy 82/182 welds identified in NRC bulletin 2004-01 were included in the risk significant determinations made by PRA to support the current program. In addition, Callaway Plant has augmented these examinations as requested by NEI. As additional research and analysis provides more insight into the risk posed by the presence of Alloy 82/182 welds in pressurizer penetrations, the information will be incorporated into program risk assessments to ensure appropriate examination locations are selected to provide early identification of cracks before RCPB failure.

- (2) Within 60 days of plant restart following the next inspection of the Alloy 82/182/600 pressurizer penetrations and steam space piping connections, the subject PWR licensees should either:*
- (a) submit to the NRC a statement indicating that the inspections described in the licensee's response to item (1)(c) of this bulletin were completed and a description of the as-found condition of the pressurizer shell, any findings of relevant indications of through-wall leakage, followup NDE performed to characterize flaws in leaking penetrations or steam space piping connections,*

a summary of all relevant indications found by NDE, a summary of the disposition of any findings of boric acid, and any corrective actions taken and/or repairs made as a result of the indications found,

or

- (b) if the licensee was unable to complete the inspections described in response to item (1)(c) of this bulletin, submit to the NRC a summary of the inspections performed, the extent of the inspections, the methods used, a description of the as-found condition of the pressurizer shell, any findings of relevant indications of through-wall leakage, followup NDE performed to characterize flaws in leaking penetrations or steam space piping connections, a summary of all relevant indications found by NDE, a summary of the disposition of any findings of boric acid, and any corrective actions taken and/or repairs made as a result of the indications found. In addition, supplement the answer which you provided to item (1)(d) above to explain why the inspections that you completed were adequate for the purpose of maintaining the integrity of your facility's RCPB and for meeting all applicable regulatory requirements which pertain to your facility.*

For lines attached directly to the pressurizer, with the exception of the surge line, the information requested in (1) and (2) above should be provided for any locations, including those remote from the pressurizer shell, which contain Alloy 82/182/600 materials which are exposed to conditions similar to those of the pressurizer environment.

Callaway Plant Response:

Callaway Plant will comply with the requirement described in (2) above within 60 days of plant restart following the next inspection of the Alloy 82/182/600 pressurizer penetrations and steam space piping connections.

As noted earlier, all Alloy 82/182/600 pressure boundary locations on the pressurizer were examined (bare metal visual) during Refuel 13 (Spring 2004). No leakage, boric acid residue due to leakage, or Carbon base metal wastage was noted. No followup NDE was required. This satisfies the 60 day reporting requirement for the current refueling (in progress at the time of issuance of this bulletin), however Callaway will, within 60 days of plant restart following the next inspection of the Alloy 82/182/600 pressurizer penetrations and steam space piping connections (Refuel 14, Fall 2005) submit to the NRC a statement indicating that the inspections described in Callaway Plant's response to item (1)(c) of this bulletin were completed and a description of the as-found condition of the pressurizer shell, any findings of relevant indications of through-wall leakage, followup NDE performed to characterize flaws in leaking penetrations or steam space piping connections, a summary of all relevant indications found by NDE, a summary of the disposition of

ULNRC-05031

July 27, 2004

Page 8 of 8

any findings of boric acid, and any corrective actions taken and/or repairs made as a result of the indications found.

LIST OF COMMITMENTS

The following table identifies those actions committed to by AmerenUE in this document. Any other statements in this document are provided for information purposes and are not considered commitments. Please direct questions regarding these commitments to Mr. Dave E. Shafer, Superintendent Licensing (314) 554-3104.

COMMITMENT	Due Date/Event
All of the locations of interest will continue to receive bare metal visual examinations near the beginning of each outage, as is required by the boric acid program, as well as the VT-2 examination at the end of each outage, as is required by the pressure testing program.	Each Refueling Outage
Submit to the NRC a report indicating that the inspections described in Callaway Plant's response to item (1)(c) of this bulletin were completed and a description of the as-found condition of the pressurizer shell, any findings of relevant indications of through-wall leakage, followup NDE performed to characterize flaws in leaking penetrations or steam space piping connections, a summary of all relevant indications found by NDE, a summary of the disposition of any findings of boric acid, and any corrective actions taken and/or repairs made as a result of the indications found.	Within 60 days of plant restart following the next inspection of the Alloy 82/182/600 pressurizer penetrations and steam space piping connections